

Growth and Characterization of Aligned Carbon Nanotubes by Microwave Plasma Chemical Vapor Deposition

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ABSTRACT

In this presentation, various growth aspects of aligned CNT using MPECVD are presented. Carbon nanotubes were grown in the same MPECVD system using hydrogen-methane-nitrogen gas reactants on a few nanometers thick metal catalyst layer on silicon substrates and characterized by Raman spectroscopy, high resolution scanning and transmission electron microscopy. Field emission investigation in terms of turn-on voltage, threshold voltage, and field enhancement factor will be presented and compared to the previously reported results. A low turn-on voltage and threshold voltage is desired for devices which can be employed for display and x-ray emission devices. Studies leading to emission stability, tip longevity, and triple junctions to boost emission will also be reported. A preliminary design of low power x-ray generation source will be presented. Many growth parameters are studied such as substrate temperature, microwave power, gas-pressure and different gas-ratios on the structural properties of both the materials. A correlation between the processing parameter and observed characteristics will be presented.

Keywords: MPECVD, carbon nanotubes, aligned CNTs